Aug. 25, 1931. W. C. McWHIRTER 1,820,756

RAILWAY SWITCH OPERATING APPARATUS

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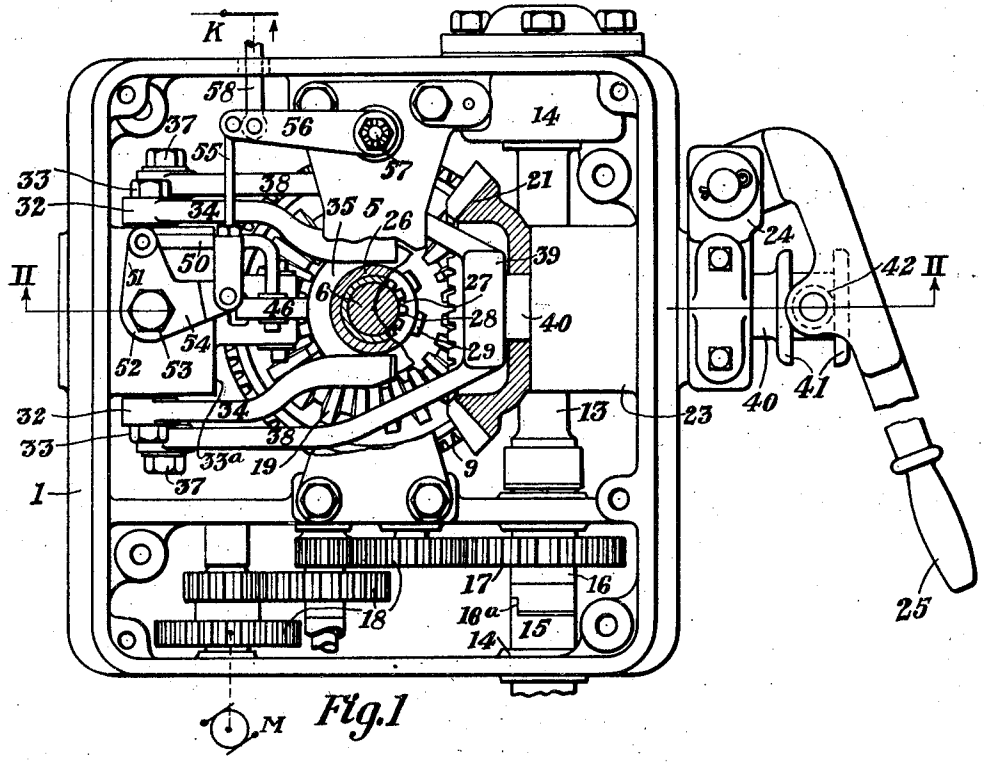


Fig.1

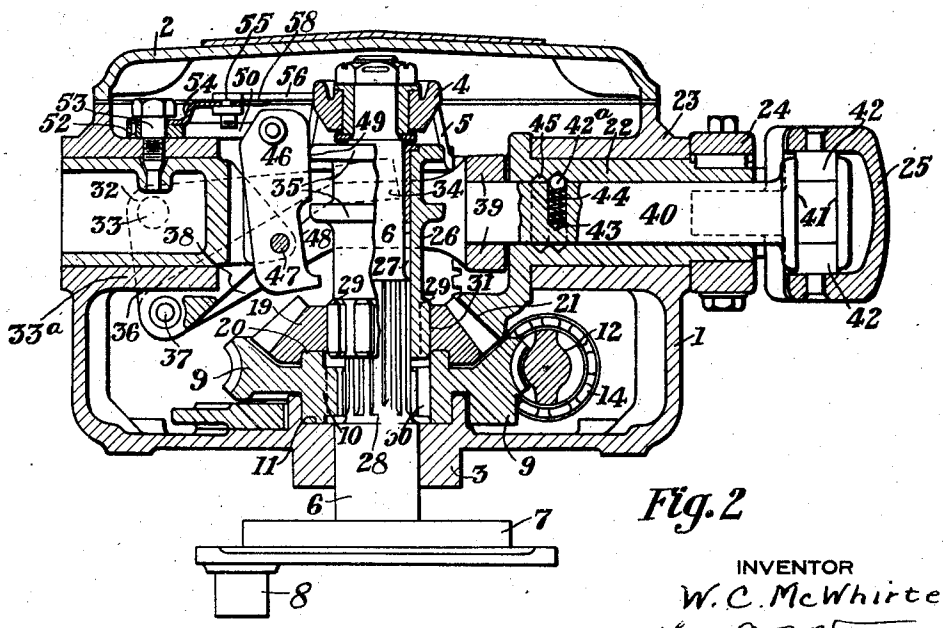


Fig.2

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UNITED STATES PATENT OFFICE

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RAILWAY SWITCH OPERATING APPARATUS

Application filed January 8, 1930. Serial No. 419,290.

My invention relates to railway switch operating apparatus, and particularly to apparatus for permitting manual operation of a power operated switch.

One feature of my present invention is the provision of a single instrumentality for connecting the switch operating mechanism with or disconnecting it from the source of power which normally operates the apparatus, and for operating the apparatus manually when disconnected from such source of power.

I will describe one form of railway switch operating apparatus embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawings, Fig. 1 is a plan view of one form of apparatus embodying my invention with the cover of the housing removed and with certain parts broken away to more clearly illustrate the construction thereof. Fig. 2 is a vertical sectional view taken substantially on line II—II of Fig. 1.

Similar reference characters refer to similar parts in each of the several views.

Referring to the drawings, the reference character 1 designates a housing provided with a removable cover 2 and adapted to be mounted adjacent a railway track switch. The housing 1 is formed with a bearing 3 in the bottom thereof and with a bearing 4 supported by a bracket 5 which is secured to the side walls of the housing. A vertically extending switch actuating shaft 6 is journalled in the bearings 3 and 4 and is provided at its lower end with a crank 7 provided with a crank pin 8. This crank and pin cooperate with suitable mechanism for actuating and locking a railway switch, which mechanism is not shown in the accompanying drawings, but which may, for example, be similar to that shown in United States Letters Patent No. 1,293,290, granted to William Zabel on February 4, 1919. In the said patent the crank 55 and the pin 58 correspond respectively to the crank 7 and pin 8 in the present disclosure.

A worm gear 9 is mounted for rotation coaxially with the shaft 6 and is formed with a hub 10 for seating engagement within a suitable step bearing 11 formed on the upper portion of the bearing 3. This gear is driven by a worm 12 fixed to a jack shaft 13 which is journalled in bearings 14 provided in the walls of the housing 1. The shaft 13 is rotated by a sleeve 15 which is mounted thereon and which is connected thereto at one end by a suitable friction drive device not shown. A sleeve 16 is loosely mounted on the shaft 13 and is operatively connected with the sleeve 15 by means of a coupling 16^a. A gear 17 is fixed to the inner end of the sleeve 16 and is driven by an electric motor M through the medium of suitable reduction gearing 18.

A beveled gear 19 is also mounted for rotation coaxially with the shaft 6, and is formed with an annular recess 20 in its lower face for seating engagement with the upper end of the hub 10 of the worm gear 9. The worm gear 9 and beveled gear 19 are thus maintained in axial alignment relative to one another and in concentric spaced relation with respect to the shaft 6. The beveled gear 19 is rotated by means of a segmental beveled gear 21 fixed to the inner end of a horizontally extending sleeve 22 which is journalled in a bearing 23 formed in the housing 1. An arm 24 is secured to the outer extremity of the sleeve 22 and forms a crank arm with which one end of a hand lever 25 is pivotally connected. This lever provides means for rotating the sleeve 22 in its bearing for purposes presently to be described.

The worm gear 9 and the beveled gear 19 are selectively connected with the shaft 6 by means of a clutch member in the form of a sleeve 26 which is mounted on the shaft 6 for vertical sliding movement. The interior of this sleeve is formed with a plurality of vertically extending teeth or splines 27 which are at all times in engagement with a plurality of similar teeth or splines 28 formed on the shaft 6. This construction insures that the shaft 6 and sleeve 26 rotate in unison but permits of a limited degree of vertical sliding movement of the sleeve on the shaft. The sleeve 26 is also formed with a plurality of exterior teeth or splines 29 on

its lower portion for selective engagement with a plurality of internal teeth 30 formed on the worm gear 9, or with a plurality of internal teeth 31 formed on the beveled gear 15. It will be apparent from an inspection of Fig. 2 of the drawings, that when the sleeve 26 occupies its lowermost position, the teeth 29 engage between the teeth 30 on the worm gear 9 and connect this gear with the shaft 6 to permit operation of the apparatus by motor M. Also, it will be apparent, that when the sleeve 26 is moved to its uppermost position, the teeth 29 thereof move out of engagement with the worm gear 9 and into driving engagement with the teeth 31 of the beveled gear 19 as shown in Fig. 2.

The sleeve 26 is raised and lowered in order to effect the desired driving connection between either of the gears 9 and 19, and the shaft 6, by means of a pair of bell crank levers 32. These levers are pivotally mounted on bolts 33 which are threaded into a boss 33ª formed on the housing 1, and the arms 34 of these levers extend inwardly in a substantially horizontal direction for engagement between a pair of spaced circumferential flanges 35 formed in the upper end of the sleeve 26. The other arms 36 of the bell crank levers 32 extend downwardly, and are pivotally connected, as at 37, with the arms 38 of a yoke 39. This yoke is fixed to the inner end of a rod 40 which is mounted for axial sliding movement within the sleeve 22. The outer end of the rod 40 is formed with a pair of spaced circumferential flanges 41 for engagement with the opposite sides of a pair of rollers 42 carried by the hand operated lever 25 intermediate its ends.

By means of the above-described construction, when the lever 25 is swung inwardly about its pivotal connection with the arm 24, the rod 40 will be moved to the left, thereby swinging the bell crank levers 32 about their pivots 33 in a clockwise direction, as viewed in Fig. 2, and shifting the sleeve 26 to its lowermost position in which it connects the worm gear 9 with the shaft 6. On the other hand, if the lever 25 is swung outwardly to the position shown in Fig. 1, the rod 40 will be moved to the right, thereby shifting the sleeve 26 to its uppermost position, in which it connects the beveled gear 19 with the shaft 6. When the sleeve 26 occupies this last mentioned position, the shaft 6 is entirely disconnected from the motor M and is connected with the beveled gear 19 so that it can be rotated manually by swinging the lever 25 about the axis of the rod 40. In this connection, it will be noted by referring to Fig. 1 that when the lever 25 is swung about its pivotal connection with the arm 24, in order to shift the position of the clutch mechanism, it functions as a lever of the second class in which the pivotal connection with the arm 24 is its fulcrum, but when this lever is swung about the axis of the rod 40 in order to rotate the gears manually, it functions as a lever of the first class in which its pivotal connection with the rod 40 is its fulcrum.

The rod 40 and the sleeve 26 are maintained against accidental displacement in either of the two positions above described, by means of a detent comprising a ball 42ª, which is mounted in an aperture 43 provided in the rod 40, and which is urged outwardly by a spring 44 into engagement with one or the other of a pair of annular grooves 45 formed in the interior of the sleeve 22.

It is desirable, when operating the apparatus by hand, that the switch actuating mechanism not only be disconnected from the motor but that the motor be also disconnected from its source of electrical energy. To this end, I provide a lever 46 which is pivotally mounted on the housing 1 as at 47. This lever is formed with a recess 48 adapted to be engaged by the flanges 35 of the sleeve 26 when the latter occupies its lowermost position and with a cam portion 49 adapted to be engaged by the flanges 35 of the sleeve 26 when the sleeve occupies its uppermost position. An L-shaped link 50 connects the upper end of the lever 46 with an arm 51 of a bell crank lever 52, which is pivotally mounted on the housing 1, as at 53. The other arm 54 of the lever 52 is connected by a link 55 with an arm 56 which is pivotally mounted on the bracket 5, as at 57. A link 58 is connected at one end to the arm 56 intermediate its length and extends through an aperture provided in the wall of the housing 1 for operative engagement at its other end with a suitable contact device K which controls the supply of electric current to the motor.

When the sleeve 26 is moved to its uppermost position, as shown in Fig. 2, in conditioning the device for manual operation, the lever 46 is swung about its pivot 47 in a counter-clockwise direction through the engagement of the flanges 35 of the sleeve with the cam portion 49 thereof, thereby actuating the parts to open the contact device K. When, however, the sleeve 26 is moved to its lowermost position, in order to re-establish a driving connection between the worm gear 9 and the shaft 6, the flanges 35 of the sleeve 26 move out of engagement with the cam portion 49 of the lever 46 and into engagement with the notch 48, thereby swinging the lever in a clockwise direction about its pivot 47 and actuating the parts to close the contact device K.

From the foregoing, it will be apparent that I have provided a very simple and efficient mechanism whereby a switch operating device may be quickly and easily connected with or disconnected from its source of

power, and actuated by hand by a single operating lever.

Although I have herein shown and described only one form of railway switch operating apparatus embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. Railway switch operating apparatus comprising a switch actuating shaft, a plurality of gear wheels mounted for rotation adjacent said shaft, means for selectively connecting said gear wheels with said shaft, a motor for rotating one of said gear wheels, and means including a single manual lever for operating said connecting means and for rotating another of said gear wheels manually.

2. Railway switch operating apparatus comprising a switch actuating shaft, a plurality of gear wheels mounted for rotation coaxially with said shaft, a clutch member for selectively connecting said gear wheels with said shaft, a motor for rotating one of said gear wheels, and a single lever for operating said clutch member and for rotating another of said gear wheels manually.

3. Railway switch operating apparatus comprising a switch actuating shaft, a plurality of gear wheels mounted for rotation coaxially with said shaft, a clutch member for selectively connecting said gear wheels with said shaft, a motor for rotating one of said gear wheels, and single means operable in one direction for shifting said clutch member and in another direction for rotating another of said gear wheels manually.

4. Railway switch operating apparatus comprising a switch actuating shaft, a plurality of gear wheels mounted for rotation coaxially with said shaft, a clutch member for selectively connecting said gear wheels with said shaft, a motor for rotating one of said gear wheels and a lever mounted for swinging movement about transversely extending axes for shifting said clutch member and for rotating another of said gear wheels manually.

5. Railway switch operating apparatus comprising a switch actuating shaft, a plurality of gear wheels mounted for rotation coaxially with said shaft, a clutch member for selectively connecting said gear wheels with said shaft, a motor for rotating one of said gear wheels, and a lever movable in one path for operating said clutch and movable in another path for rotating another of said gear wheels manually.

6. Railway switch operating apparatus comprising a switch actuating shaft, a plurality of gear wheels mounted for rotation coaxially with said shaft, a clutch member for selectively connecting said gear wheels with said shaft, a motor for rotating one of said gear wheels, a rotatable sleeve operatively connected with another of said gear wheels for rotating the same, a rod mounted for longitudinal sliding movement in said sleeve for operating said clutch member, and a manually operable lever pivotally connected with both said sleeve and said rod for rotating said sleeve and for moving said rod longitudinally therein.

7. Railway switch operating apparatus comprising a switch actuating shaft, a plurality of gear wheels mounted for rotation coaxially with said shaft, a clutch member for selectively connecting said gear wheels with said shaft, a motor for rotating one of said gear wheels, a rotatable sleeve operatively connected to another of said gear wheels for rotating the same, a rod mounted for longitudinal sliding movement in said sleeve for operating said clutch member, and manually operable means operatively connected with both said sleeve and said rod for rotating the former and for sliding the latter therein.

8. Railway switch operating apparatus comprising a switch actuating shaft, a plurality of gear wheels mounted for rotation coaxially with said shaft, a clutch member for selectively connecting said gear wheels with said shaft, a motor for rotating one of said gear wheels, a rotatable sleeve operatively connected to another of said gear wheels for rotating the same, a rod mounted for longitudinal sliding movement in said sleeve for operating said clutch member, an arm on said sleeve, a manually operable lever pivotally mounted on said arm and having an operative connection with said rod for rotating said sleeve and for sliding said rod therein.

9. Railway switch operating apparatus comprising a switch actuating shaft, a plurality of gear wheels mounted for rotation coaxially with said shaft, a clutch member for selectively connecting said gear wheels with said shaft, a motor for rotating one of said gear wheels, a rotatable sleeve operatively connected with another of said gear wheels, a rod mounted for longitudinal sliding movement in said sleeve for operating said clutch member, an arm on said sleeve, a manually operable lever pivotally mounted on said arm and having an operative connection with said rod and adapted to be swung about the axis of said sleeve to rotate the same and about the axis of its pivotal connection with said arm to slide said rod longitudinally in said sleeve.

10. Railway switch operating apparatus comprising a switch actuating shaft, a power operated gear and a manually operable gear mounted for rotation coaxially with said shaft, a motor for rotating said power operated gear, a clutch member for selectively

connecting said gears with said shaft, a rotatable sleeve, a gear carried by said sleeve for intermeshing engagement with said manually operable gear, a rod mounted for axial sliding movement in said sleeve for operating said clutch member, and a manually operable lever mounted to swing about the axis of said sleeve for rotating said sleeve and about an axis transverse thereto for actuating said rod.

11. Railway switch operating apparatus comprising a switch actuating shaft, a plurality of gear wheels mounted for rotation adjacent said shaft, means for selectively connecting said gear wheels with said shaft, a motor for rotating one of said gear wheels, a single manually operable lever, and means actuated by said lever for operating said connecting means and for also rotating another of said gear wheels.

12. Railway switch operating apparatus comprising a switch actuating member, two movable elements, means for selectively connecting one of said elements or the other with said member, a motor for operating one of said elements, a single manually operable lever, and means actuated by said lever for operating said connecting means and also operating the other element.

13. Railway switch operating apparatus comprising a switch actuating member, two movable elements, a clutch for selectively connecting one element or the other with said member, a motor for operating one of said elements, and a single manually operable lever for operating said clutch and for moving the other of said elements.

In testimony whereof I affix my signature.

WILLIAM C. McWHIRTER.